University of Alberta

The Relationship Between Method of Pain Management during Labour and Birth Outcomes

by

Nancy Carol Walker

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of Master of Nursing

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ABSTRACT

The purpose of this study was to examine the relationship between method of pain management during labour and birth outcomes. A retrospective comparative chart review of 233 primiparous deliveries was conducted and group assignment was based on method of pain control (i.e., non-narcotic, narcotic, or epidural). Chi-square analysis of the data showed a significant increase in the rate of instrumental and cesarean section delivery with the use of epidural. More than the expected number of patients received syntocinon augmentation, and the length of the second stage of labour was significantly longer in the epidural groups. A significant difference was also found in apgar scores in those who received an epdiural before 5 centimeters, although apgar scores were satisfactory across all groups. No differences were found related to the time of epidural placement, nor in maternal temperature.

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CHAPTER 1

INTRODUCTION

Controversy surrounds the various analgesic methods utilized to alleviate pain during labour. Over the centuries, and in all cultures, myths and rituals have evolved around the pain of childbirth. In the mid 1800's, physicians experimented with chloroform, ether, and other inhaled anesthetics with varying degrees of success (Bonica & McDonald, 1990; Smedstad, 1992). Injectable narcotic analgesics were introduced in the early 1900's, often with serious detrimental effects on the parturient and newborn (Stampone, 1990). During the 1950's, natural childbirth and the Lamaze method of childbirth were advocated and it was believed that the pain of childbirth could be reduced through increased knowledge, relaxation, and breathing exercises (Dick-Read, 1944). The use of regional anesthesia was also under investigation and by 1960, continuous epidural block was being used (Smedstad, 1992).

A regime of breathing and relaxation techniques such as hydrotherapy and massage, combined with the use of nitrous oxide or narcotic analgesia, continue to be used as methods of pain management during labour. Epidural anesthesia has also become a popular method of pain relief during labour.

While decreasing pain, narcotics are known to cross the placenta causing varying degrees of respiratory depression in the newborn (Steiger & Nageotte, 1990). The effects of epidural anesthesia are widely debated and have been associated with prolonged first and second stages of labour, malposition and

malrotation, increased rates of instrumental delivery, and increased frequency of cesarean section (Morton, Williams, Keller, Gambone, & Kahn, 1994). There is also concern about the effects of hypoxia on the fetus with epidural anesthesia (Vinson, Thomas, & Kiser, 1992).

Despite years of investigation into various methods of pain management in labour, the risks and benefits are debated and research findings are inconclusive. There is uncertainty on the part of nurses about how to relate current information to women and their partners. It is the role of the nurse providing antenatal education to provide information on methods of pain management, including the risks/benefits of various medications. Women in labour must be accurately informed so that they can choose pain management strategies that are right for them.

Nurses are members of the professional group that most often provide continuous support to labouring women. Therefore, their recommendations and suggestions have a great impact on decisions made by pregnant women and their families. According to Allen (1983) nursing is a primary health resource for families. Allen (1983) believes that nurses must provide appropriate learning situations where clients have access to pertinent health information, opportunities to discuss and share, and the ability to test appropriate action plans. The nurse is an advocate for the kind of care the family requires. Collaboration is the cornerstone of the nurse-client relationship. The role of the nurse is to engage the family in becoming active participants and equal partners in decision making regarding their health. As consumers of health care, clients

need to be appraised of the quality of information available to guide decisions about their own health. Allen (1983) cautions however, that unless knowledge is grounded in data with evidence to support positive health outcomes, professionals should act cautiously when providing information to clients. Nurses, midwives, prenatal instructors, and other health care workers must be knowledgeable of the benefits, risks, and complications of pain management strategies and how these factors may affect birthing outcomes.

Purpose of the Study

The purpose of this study was to explore the relationship between method of pain management during labour and birth outcomes. The specific research questions were:

1. What is the relationship between non-epidural and epidural methods of pain relief during labour and rates of normal vaginal delivery, instrumental delivery, and cesarean section in primiparous women?

2. What is the relationship between the incidence of normal vaginal delivery, instrumental delivery, and cesarean section in primiparous women who receive epidural anaesthesia during labour before 5 centimeter dilatation as compared to those whose epidural is placed after 5 centimeter dilatation?

3. What is the relationship between non-epidural and epidural methods of pain relief during labour in primiparous women and the use of Syntocinon augmentation during the first stage of labour?

4. What is the relationship between the length of the second stage of labour in primiparous women who receive epidural anaesthesia as compared to those who receive non-epidural methods of pain relief?

5. What is the effect on the Apgar Scores at one minute and five minutes in newborns of primiparous mothers who use non-epidural methods of pain relief compared to those who receive epidural anesthesia?

6. What is the relationship between the use of epidural anesthesia and maternal temperature?

Definition of Terms

Method of Pain Management: Any strategy used to reduce or relieve pain during labour. Includes hydrotherapy, breathing and relaxation, nitrous oxide, narcotics, or epidural anesthesia.

Normal vaginal delivery: Unassisted spontaneous vaginal delivery with or without episiotomy.

Instrumental delivery: Outlet forceps or vacuum extractor.

Cesarean section: Operative delivery usually through lower segment uterine incision.

Length of the second stage: The length of time between 10 centimeters dilatation and birth.

Syntocinon: Synthetic Oxytocin given intravenously during labour which initiates and promotes rhythmic uterine contractions.

Maternal Pyrexia: Maternal temperature of 37.5°C or higher during labour or immediately following birth (4 hours).

Apgar Score: System of scoring an infant's condition one minute and five minutes after birth. The heart rate, respiration, muscle tone, color, and response to stimuli are scored 0, 1, or 2. The range for a healthy newborn is 6 to 10 at 1 minute and 7 to 10 at 5 minutes.

Significance of the Study

With the change in focus from an illness to a wellness based approach to health care in the declaration of Alma-Ata of "Health for all by the Year 2000" (WHO, 1978), significant steps have been made in the evolution of health promotion as an approach to achieving this goal. Health promotion aims at fostering public participation and focuses on approaches that enable people to take greater responsibility and increase control over factors which affect their health (Epp, 1986). The Alberta Association of Registered Nurses states that "health promotion is an integral part of nursing in all practice settings". Nurses continual contact with clients, their knowledge and skills, makes them appropriate professionals to practice health promotion. Nurses are in a position to facilitate the process of enabling or empowering others (AARN, 1989). However, empowering or enabling people to take responsibility in health-related decisions has implications for nursing requiring a paradigm shift from a "do to or do for" to a "do with" focus.

Health promotion encompasses the activities of cooperation, collaboration, and coordination. Collaboration is the foundation of the nurse-client relationship and the client becomes an active participant in decisions regarding health care choices (Allen, 1983). The nurse is also a primary health resource for clients, and as such, her role is to act as a teacher, consultant, facilitator, advisor, and advocate (Allen, 1983). The nurse must have the knowledge to provide clients with information to make informed choices. More specifically, those nurses providing antenatal education, and those in the clinical

area, must be knowledgeable about the side-effects, risks and benefits of available comfort measures. The nurse is an advocate for labouring women. Women in labour must be informed and given the right to exercise their choice as to whether or not they want intervention and to determine which intervention they are willing to try.

Iglesias (1993) suggests that support and cooperation of nurses must be achieved if epidural rates are to increase in rural areas. Health promotion is no longer the process of professionals telling individuals what to do and what choices to make. This process hinders client empowerment necessary to ensuring active participation in health-related decisions.

This study provides valuable information on how different methods of pain management during labour affect birth outcomes. Nurses can thus provide clients with pertinent information to enable them to make informed choices regarding the method of pain management that is most appropriate for them. Collaboration between the client, physician, and nurse, to help determine the most advantageous method of pain management in each particular situation is an ideal. Nurses have an important role in nurturing and enabling health promotion. In order to assume this role, increased knowledge is essential.

Summary

The purpose of the study and the research questions have been established. Utilizing Allen's Model, the significance of the study as it pertains to Nursing, has been outlined. Chapter 2 contains a review of the literature on non-narcotic, narcotic, and epidural methods of pain management. Study design and methods are presented in Chapter 3. The results of the study are documented in Chapter 4 and the discussion, implications for nursing, and limitations of the study are presented in Chapter 5.

CHAPTER 2

REVIEW OF THE LITERATURE

INTRODUCTION

Various methods of pain management in labour and how these methods affect birth outcomes are discussed. The literature review is divided into three sections. Non-narcotic pain management and narcotic pain management methods are reviewed in the first and second sections. An overview of studies to determine if epidural anesthesia has been demonstrated to have an effect on the course of labour and birth outcomes is presented in the third section.

Non-narcotic Methods of Pain Management

Non-narcotic methods of pain management that have been identified include hydrotherapy, breathing and relaxation techniques, and nitrous oxide. These pain management strategies are currently taught in the prenatal period and/or employed in labour rooms, either alone, or in combination with other methods.

Dick-Read (1944) reported that superstitions, civilization, and cultural misinformation caused women to fear childbirth, and this fear led them to interpret the sensation of uterine contractions as pain. He theorized that fear produces tension which in turn increases pain leading to a vicious cycle of escalating pain. If the fear could be reduced through increased knowledge and understanding of the mechanisms of labour and delivery, an increasing state of

relaxation could be achieved, and childbirth could be a less painful process. Melzack and associates (1981) report that relaxation and conditioned response decrease the emotional reaction to pain. Primiparas who had not attended prepared childbirth classes ranked their pain as the highest and training in breathing and relaxation methods reduced pain scores by 8 to 10 percent. Wuitchik and associates (1989) also report that women in labour with high levels of pain, anxiety, and distress-related thoughts had longer labours. Those women who report horrible or excruciating pain in labour required cesarean section more often (Wuitchik, Bakal, & Lipshitz, 1989).

Hydrotherapy has been found to be a potent form of relaxation, comfort, and pain relief for women in labour (Church, 1989; Milner, 1988; Odent, 1983; Waldenstrom & Nilsson, 1992). During hot baths women relax and their cervix often dilates more rapidly than expected (Milner, 1988). Researchers theorize that women in labour produce endorphins which help them cope with labour pain. When the parturient is tense, anxious or afraid, her body produces adrenaline. The adrenaline counteracts the effects of natural endorphins. Increased comfort in a hot bath leads to less anxiety, decreased adrenaline production, and increased oxytocin and endorphin production. Consequently labour is stimulated and the cervix often dilates more rapidly (Church, 1989; Milner, 1988; Odent, 1983). Church (1989) states that when a woman at term lies in a tub of heated water that supports her body she feels almost weightless. Her muscles become less tense because they do not have to support her entire weight, and she is able to relax without using medications and experiences less

pain.

Another reported benefit of hydrotherapy is that it allows for easier rotation of occiput posterior and transverse presentations (Aderhold & Perry, 1991; Church, 1989; Milner, 1988; Odent, 1983). These fetal positions often cause protracted painful labours. While in the hot baths parturients are encouraged to assume different positions such as squatting, side-lying, or getting on their hands and knees. These positions often induce relaxation and pain relief to such a degree that spontaneous rotation occurs. Milner (1989) reports that at the Hinchingbrooke Hospital in 1986, 32.8 percent of primiparas who used warm baths, massage, and occasionally some entonox, did not require any other type of pain relief.

Inhalation nitrous oxide (entonox) is another popular method of pain relief in labour. It is thought to be relatively safe for the mother and the baby, but may create an environmental hazard for attending nurses. Prolonged exposure to nitrous oxide may be related to increased spontaneous abortion rates, reduced fecundability, congenital abnormalities, certain malignancies, hepatic and renal dysfunction, and adverse haematologic, neurologic and immune effects (American Society of Anesthesiologists, 1974; Corbett, Cornell, Endres, Lieding, 1974; Johnston, 1993; Schumann, 1990). Johnston (1993) reports that women exposed to unscavenged gas for 5 hours or more per week have a 60 percent lower probability for conception per menstrual cycle than those not exposed. Schumann (1990) reports that health personnel in operating rooms, and midwives and obstetric nurses in labour and delivery rooms, are susceptible to

toxicity from excessive and lengthy contact. Schumann (1990) believes that "these groups are especially vulnerable to toxicity, owing to trace amounts that may accumulate over a lifetime from occupational exposure" (p. 214).

Narcotic Pain Management

The hypodermic syringe was used in the early 1900's for injectable analgesics in childbirth. The drugs often caused sleepy, forgetful mothers and neonates with respiratory depression. While decreasing pain, narcotics cross the placenta leading to respiratory depression in the newborn (Abboud, Khoo, Miller, Doan, & Henriksen, 1982; Alahuhta, Rasanen, Jouppila, P., Jouppila, R., and Hollmen, 1993; Hamza, Benlabed, Orhant, Escourrou, Curzi-Dascalova, & Gaultier, 1992; Oxorn & Foote, 1975; Steiger & Nageotte, 1990). Effects of the narcotics in the newborn are related to the total dose and time interval between injection and birth. The effects on the newborn are highest when intramuscular narcotics are administered 2 to 3 hours before delivery. When administered 1 hour or less before birth, respiratory depression is usually not significant (Morrison, Whybrew, Rosser, Bucovaz, Wiser, & Fish, 1976; Oxorn & Foote, 1975; Shnider & Moya, 1964).

The effects of administration of maternal intravenous meperidine on neonatal breathing patterns has also been examined. Hamza and colleagues (1993) examined neonatal breathing patterns during active and quiet sleep after maternal administration of intravenous meperidine and found that there were significantly more apneic episodes and a higher percentage of time with oxygen

saturation at less than 90 percent in the meperidine group than in newborns whose mothers did not receive any opioids. Others have found similar effects (Gerhardt, Bancalari, Cohen, Macias-Loza, 1977; Roberts, Kane, Percival, & Snow, 1957). It has been well documented that narcotics, whether administered intramuscularly or intravenously, affect apgar scores and neurobehavioral scores in the newborn (Brackbill, Kane, Maniello, & Abramson, 1974; Kuhnert, B., Linn, Kennard, & Kuhnert, P., 1985; Shnider & Moya, 1964).

Epidural Analgesia for Pain Management

Although many women are choosing epidural anesthesia, the effect on the course of labour and birth outcome remains controversial. Concern for the safety of the mother and fetus have been reported. Hypotension has been reported to occur in approximately 20 to 40 percent of patients who receive epidural anesthesia (Chestnut, Vincent, McGrath, Choi, & Bates, 1994a; Chestnut, McGrath, Vincent, Penning, Choi, Bates, & McFarlane, 1994b; Smedstad, 1992). Fetal heart rate changes which occur concurrently with the initiation of epidural analgesia are believed to be due to maternal hypotension and fetal uptake of local anesthesia and analgesia (Abboud et al., 1982; Steiger & Nageotte, 1990).

The accumulation of epidurally administered anesthetic-opioid combinations in the newborn and possible adverse neonatal effects has been investigated. Alahuhta and colleagues (1993) compared the effects of epidural sufentanil and bupivacaine on the maternal uterine and fetal umbilical artery

blood flow dynamics during normal labour (n=30). Maternal and neonatal assessment included continuous fetal heart monitoring and employing an ultrasound colour Doppler technique for measuring blood flow velocity waveforms in the uterine and umbilical arteries. The most frequent finding was decreased fetal heart rate variability after sufentanil administration. Although fetal heart variability was decreased, no intervention was necessary, and there were no clinical signs of fetal distress at delivery. These researchers believe that this may be due to the direct drug effect of sufentanil on the central nervous system of the fetus as there were no significant changes in the indexes reflecting peripheral vascular resistance in the umbilical artery or uterine arteries, nor any maternal hypotension at the time of the fetal heart rate changes.

Loftus and associates investigated the placental transfer and neonatal effects of epidural sufentanil and fentanyl infused with bupivacaine for labour analgesia (n=36) (Loftus, Hill, & Cohen, 1995). Neonatal assessment included Apgar scores, umbilical cord blood gas analyses, and neurobehavioral testing at delivery and at 2 and 24 hours of life. They found substantial placental transfer of both sufentanil and fentanyl. There were no differences in Apgar scores, time to sustained respiration, or neurobehavioral scores at the time of delivery and at 2 hours, when compared with the bupivacaine group. However, the neurobehavioral scores at 24 hours were significantly lower in the bupivacaine-fentanyl group as compared to the other two groups. They speculated that this may relate to a longer elimination half-life for fentanyl resulting in a persistent, mild depressant effect. Despite their findings, they do not believe that the

differences in the neurobehavioral scores indicate neurobehavioral depression that is of clinical concern.

Thorp and colleagues (1993) investigated the use of intravenous narcotics versus epidural bupivacaine during labour and report newborns in both groups had: 1) a similar proportion experiencing meconium-stained amniotic fluid, 2) no difference in proportions of low 1 and 5 minute apgar scores, 3) no differences in umbilical cord and arterial and venous blood gas values and, 4) no increased risk for hypoxemia or metabolic acidosis at delivery (Thorp, Hu, Albin, McNitt, Meyer, Cohen, & Yeast, 1993). Russell and Reynolds (1993) also found no significant effect on Apgar scores, umbilical cord pH, or neurological and adaptive capacity scores at 2 and 24 hours when comparing different dosages of epidural analgesia.

Chestnut and colleagues (1994a; 1994b) compared infants who received early epidural with infants who received late epidural analgesia. The late group had lower umbilical artery and venous blood pH and higher umbilical arterial and venous blood carbon dioxide tension measurements at delivery. However, there was no significant difference between groups in umbilical arterial or venous blood oxygen tension or base deficit. The researchers believe that these differences likely reflected higher maternal blood and carbon dioxide tension, and speculate that mild maternal hypercarbia resulted from the administration of nalbuphine, followed by the administration of epidural analgesia. There was no evidence however, that the late group were at increased risk of hypoxemia or metabolic acidosis at delivery. Alahuhta and associates (1993) state that "later

neonatal courses were uneventful in every case" (p. 234). While there are fetal effects, outcomes appear comparable with the use of intravenous narcotics, dilute epidural anesthetics, and epidural narcotics.

Maternal fever following epidural anesthesia is another area of concern for both the mother and fetus. Fusi and associates report an association between epidural analgesia and maternal pyrexia during labour, but found no change in temperatures of women whose pain was managed with narcotics (Fusi, Maresh, Steer & Beard, 1989). Others have reported similar results (Camann, Hortvet, Hughes, Bader, & Datta, 1991; Macaulay, Randall, Bond, & Steer, 1992; Vinson, et al., 1993). Fusi and colleagues concluded that an epidural block creates an imbalance between the heat producing and heat dissipating mechanisms in the body, which can lead to the development of pyrexia during labour. Pello and associates (1991) found that epidural analgesia was associated with an increase in basal fetal heart rate and less fetal heart variation. They theorize that fetal tachycardia may be due to a rise in maternal temperature, and combined with episodic changes of fetal heart variation, a pattern suggesting fetal distress emerges. Unnecessary cesarean section may result. Vinson and associates (1993) also found that in both a retrospective chart review and a prospective cohort study, that epidural analgesia is associated with an increase in maternal temperature during labour and possibly with an elevation of the newborns temperature.

Lieberman and colleagues (1995) examined whether the use of epidural anesthesia for pain relief during labour is associated with an increased risk of

cesarean delivery. A retrospective study of 1,777 low risk, term primiparous women in spontaneous labour was conducted. Women receiving an epidural were 3.7 times more likely to have a cesarean section. They also report a 5.6 fold increase in cesarean section when epidurals were administered before 5 centimeters dilatation. Significant risk for cesarean section remained for epidurals administered later in the first stage of labour. The increase in cesarean section in both the first and second stages of labour was related to failure to progress (Lieberman, Cohen, Lang, D'Agostino, Datta, & Frigoletto, 1995). Two retrospective studies by Thorp and colleagues (1989, 1991) report similar findings. In both studies an increase in cesarean section rate for dystocia with epidural when compared with non-epidural women was found. However, the cesarean section rate for fetal distress was similar in both groups (Thorp, Parisi, Boylan, & Johnston, 1989; Thorp, Eckert, Ang, Johnston, Peaceman, & Parisi, 1991).

Thorp and colleagues (1993) conducted a controlled prospective clinical trial. They randomized 93 nulliparous patients in spontaneous labour to receive either intravenous meperidine, or epidural for labour and delivery analgesia. The results were striking. Patients receiving epidural analgesia experienced prolongation of both the first and second stages of labour, slowing in the rate of cervical dilatation, a twofold increase in oxytocin augmentation, more frequent incidence of malposition, and an increased cesarean section rate for dystocia (i.e., 25% versus 2.2%) than in those receiving intravenous opioids. Their intended sample size was 200 but they felt it was unethical to continue with the

difference in cesarean section rates between the groups.

Thorp et al., 1993 concluded that the high incidence of malposition associated with epidural analgesia results from laxity of the pelvic floor musculature. Epidural analgesia in early labour increased the risk of malposition and when administered at 5 centimeters or greater cervical dilatation, there was less effect because optimal positioning of the fetal head was more likely to be achieved. The earlier placement was carried out the greater the risk of cesarean section (50% at 2 cm versus 0% at > 5 cm). These researchers suggest that initiation of the epidural should be delayed until the patient is at least 5 centimeters dilated. They recommended that patients should be told that epidural analgesia will increase their chances of a cesarean section.

The authors of two prospective studies report different findings (Chestnut et al., 1994a; 1994b). The question in the first study was, "does early epidural analgesia affect the obstetric course in nulliparous women receiving oxytocin?" One hundred and fifty women receiving intravenous oxytocin were randomized to either early or late epidural analgesia groups. Epidural analgesia was identical for both groups. The early group was given epidural analgesia with cervical dilatation of at least 3 centimeters but less than 5 centimeters. The late group was given Nalbuphine 10 mg intravenously until they achieved 5 centimeters cervical dilatation. They found that early epidural analgesia did not increase the frequency of instrumental delivery or cesarean section (18% versus 19% in the early and late groups, respectively), nor did they find any significant difference in the length of the second stage, nor a greater frequency of dystocia between the

early and late groups. Thorp and associates (1994) have several questions regarding this study. They suggest that Chestnut's study was based on "intent to treat", as all patients had epidural. They also point out that the differences in cervical dilatation between the early and late epidural groups was quite negligible (at least 3 cm vs 5 cm) (Thorp, Hu, Albin, Meyer, Cohen, Yeast, Hedrick, McKenzie, & Gerald, 1994). Since all of the patients in this study received epidural anesthesia Chestnut cannot report that epidural does not increase the cesarean section rate because he did not have a non-epidural group with which to compare.

Chestnut and associates (1994b) examined whether early administration of epidural analgesia affected obstetric outcome in nulliparous women who were in spontaneous labour. Randomization criteria and anesthetic management were identical to the previous study. Although all subjects (n=344) were in spontaneous labour and not receiving oxytocin, the results were similar to their previous study. They concluded that epidural analgesia did not prolong labour or increase the incidence of oxytocin augmentation, nor did it increase the incidence of malposition, instrumental delivery, or cesarean section rate, when compared with patients receiving intravenous nalbuphine and late epidural analgesia. These authors report that is unnecessary to await 5 centimeters dilatation before administration of epidural anesthesia in nulliparas who are in spontaneous labour at term.

A retrospective study of all 544 nulliparous deliveries between January 1, 1984 and December 31, 1989 was conducted to determine the effect of

introducing an epidural service into a Canadian rural community hospital on the method of delivery (Iglesias, Hindle, Armstrong, & Saunders, 1993). Information regarding epidural use, method of delivery, length of the second stage, and use of syntocinon were extracted from case records. Of the 544 women, 299 received epidural analgesia. A chart review of routinely recorded data revealed that bupivacaine (0.25%) was used to establish epidural anaesthesia and on occasion more dilute solutions (0.125% or 0.375%) were used. The block was supplemented with fentanyl 25 to 50 mcg, if necessary. Their results are striking. Epidural anesthesia gained rapid acceptance increasing from 9 percent to approximately 75 percent of nulliparous deliveries by the final year of the study. Syntocinon usage increased dramatically (14% to 52%), the average length of the second stage increased significantly (average 47 to 76 minutes), the rate of normal vaginal deliveries increased dramatically (from 37% to 68%), and the cesarean section rates overall decreased from 26 percent to 12 percent, a 75 percent reduction (cesarean section for dystocia decreased from 19.4% to 9%).

It is interesting to note that as epidural use rose, the cesarean section rates decreased and there was a marked increase in the rate of normal vaginal deliveries, a finding that had not been reported before. However, several factors may account for this incongruity. Prior to 1986, there was no protocol shared by staff physicians for the management of labour. By 1986, the National Consensus Conference on Aspects of Caesarean Birth guidelines were introduced at the hospital and served to influence the management of labour. This included urging physicians to be patient with a slowly progressing labour,

that dysfunctional labour should be stimulated, and that labour should be established beyond the latent phase (cervical dilatation of 3 cm) before a diagnosis of dystocia could be made.

Iglesias and colleagues (1993) conclude that although the National Consensus Conference on Aspects of Cesarean Birth guidelines likely improved the management of dystocia, the reduction of cesarean section rates from 26 percent to 12 percent would not have been possible without an epidural service. They report that without epidurals they would not have been able to stimulate dysfunctional labours to the same degree, allowing the patient to tolerate prolongation of the second stage, leading to an increase in normal vaginal deliveries. There are however, many other explanations as to the decrease in cesarean section rates, and these will be discussed below.

Farabow and associates (1993) conducted a 20-year retrospective analysis (1972 through 1991) examining the efficacy of epidural anesthesia (n=14,598) and report that the association between women requiring cesarean section and the use of epidural anaesthesia is inversely related. Epidural anesthesia was associated with increased oxytocin usage to initiate or stimulate adequate labour. Of women requiring cesarean section only 24 percent were given epidural anesthesia whereas the remaining 75 percent received other methods of anesthesia. Farabow and associates (1993) did not offer any conclusions regarding this association. However, other factors occurring between 1970 and 1992 may have affected the cesarean section rates (Farabow, Roberson, Maxey, & Spray, 1993).

Historically, there has been widespread concern over the cesarean section rate which increased from 5.5 percent in 1970 to 22.7 percent in 1985 (Boylan, Frankowski, Rountree, Selwyn, & Parrish, 1991; Placek and Taffel, 1987; Taffel, Placek, & Moien, 1985). Reasons for this increase included: 1) an increased trend to diagnose and perform cesarean sections for dystocia in primiparas, especially those with private insurance (22.5% for private insurance versus 11.4% without insurance), 2) a major change in the obstetrical management of breech presentations (1970 - 14.8% cesarean section rate, 1985 - 80.4% rate), 3) repeat cesarean section in 95 percent of patients, and 4) an increase in cesarean section rate for fetal distress with new fetal monitoring techniques (Boylan et al., 1991; Placek & Taffel, 1987; Taffel et al., 1985). Analysis of trends revealed only a small increase in the cesarean rate for fetal distress. The magnitude of the increase was due to changes in attitudes toward breech deliveries, but primarily due to diagnoses of dystocia (Hughey, LaPata, McElin, & Lussky, 1977; Martin, Moyyen, & Gelfand, 1982).

Researchers argue that cesarean section rates began to decrease in the late 1980's and early 1990's due to the impact of several factors. First, insurance companies in the United States expressed concern over the rising health care costs for cesarean sections. Many insurance companies deinsured cesareans and pressure was exerted on physicians to reduce the number of cesarean sections (Martin, et al., 1982; Taffel et al., 1985). Second, a shift in attitude from "once a cesarean section, always a cesarean section" slowly began to change the trend. In 1982 guidelines for "Vaginal Delivery after Cesarean

Childbirth" was issued by the American College of Obstetrics and Gynecology. It was reissued in 1985 to stress its importance. In 1984 only one percent of patients were given a trial of labour (Flamm, Dunnett, Fischermann, & Quilligan, 1984). In 1992, a similar directive was issued by the College of Physicians and Surgeons of Alberta outlining guidelines for a trial of labour for "Vaginal Birth after Cesarean Birth". The third reason for the decrease was the introduction of guidelines from the National Consensus Conference on Aspects of Cesarean Birth which qualifies the diagnosis for dystocia. Similar guidelines were being introduced into American hospitals.

Boylan and associates (1991) report that they introduced "Active Management of Labour" (AML) into their Texas hospital to reduce the incidence of cesarean section for dystocia in nulliparae (N=3,901). Following the introduction of AML, they report a decrease in the incidence of cesarean section of 5.5 percent, a decrease in the diagnosis of dystocia of 18 percent, and a significant increase in spontaneous vaginal deliveries. Although it was not reported how many epidurals were performed, they state that epidurals were freely available. If the additive influence of trial of labour, oxytocin augmentation, and improved obstetrical management led to this dramatic decrease in cesarean section rates, this would be a beneficial area for further study.

Although the above factors may have decreased the incidence of cesarean section, there is a consistent association between epidural analgesia and cesarean section. A meta-analysis of six randomized studies between 1989 and 1993 was conducted to evaluate the effect of epidural analgesia on the

cesarean section delivery rate (Morton, et al., 1994). The pooled cesarean delivery risk difference as a result of epidural analgesia was 10 percent greater than for no-epidural women. More than a 9 percent increase was shown for cesarean deliveries for dystocia. The authors suggest that their findings demonstrate a significant risk of cesarean delivery if the epidural was placed before 5 centimeters dilatation and the risk was not significantly increased if it was placed at 5 centimeters or greater. They also concluded that cesarean deliveries associated with epidural occurred primarily due to the diagnosis of dystocia.

Summary

Various methods of pain relief during labour and delivery have been implemented over the years. Controversy continues to exist about which method is the most beneficial while causing the least risk to both the mother and fetus. Antenatal education, breathing and relaxation techniques, and hydrotherapy have been found to promote relaxation, increase comfort, and provide pain relief in labour. These methods allow women to cope better and reduce their need for analgesics during labour. Narcotics analgesics have been found to decrease pain although the short and long-term effects of respiratory depression may increase the risk to the newborn. Inhalation nitrous oxide is safe for the mother and fetus but may affect attending nurses and midwives who can accumulate toxic amounts due to daily exposure. Although epidural analgesia provides pain relief, administration of epidural has been associated with various maternal and fetal complications. Complications of the epidural procedure include risk of hypotension resulting in decreased placental perfusion. Epidural has also been reported to affect the process of labour by causing prolonged second stage of labour and malposition and malrotation of the fetal head leading to altered birth outcomes. Specifically, epidural has been reported to increase the numbers of instrumental deliveries and cesarean sections. Although an association between epidural analgesic and cesarean section exists, the relationship is unclear. Many possible factors such as spontaneous labour or lack therefore; time of placement

of the epidural; ambulation during labour; type and amount of analgesic/anesthetic combinations utilized; timing of oxytocin augmentation; obstetrical management, and diagnosis of dystocia may affect cesarean section rates.

CHAPTER 3

METHOD

Design

To examine the relationship between method of pain management during labour and birth outcomes, a retrospective comparative design was used and charts were assigned to one of four groups depending on the type of treatment that had been given.

The four groups were defined as follows:

Group 1 (non-narcotic group). Hydrotherapy, breathing and relaxation, or nitrous oxide, were used during labour for pain management.

Group 2 (narcotic group). Narcotics were used during labour for pain management.

Group 3 (epidural before 5 cm dilatation). Epidural analgesia/anesthesia was used during labour for pain management before 5 centimeters dilatation. Narcotics may or may not have been injected into the epidural space.

Group 4 (epidural after 5 cm dilatation). Epidural analgesia/anesthesia was used during labour for pain management after 5 centimeters cervical dilatation had been achieved. Narcotics may or may not have been injected into the epidural space.

Extraneous variables that may affect the results are maternal characteristics (age, height, and weight) and infant birthweight.

Sample

Charts of primiparous deliveries at the Red Deer Regional Hospital from January 1, 1995 to July 20, 1997 were evaluated. Red Deer Regional Hospital has approximately 1,800 deliveries per year, with about 40 percent being primiparous women. The annual cesarean section rate, including elective and emergency sections, is approximately 18 percent. The 1994 epidural rate was 2.4 percent.

Fifteen charts were to be included for each of the seven dependent variables being measured, making a total of 105 charts in each group. Since the 1994 epidural rate at Red Deer Regional Hospital was 2.4 percent or approximately 43 births per year, it was not possible to have 105 subjects in the epidural groups by reviewing charts over the specified time period. Therefore, all charts of primiparous women who received epidural anesthesia and met the inclusion criteria were included. In order to make the groups as similar as possible, the non-narcotic and narcotic groups were matched with the epidural groups according to birthing day and cervical dilatation on admission.

Charts of women who met the following criteria were selected and reviewed:

(1) Primiparous women were included because the nature of labour differs between primiparous and multiparous women. The primiparous cervix has not previously effaced and dilated. Effacement occurs prior to dilatation and then dilatation occurs on the average of one centimeter per hour. The multiparous cervix usually effaces and dilates concurrently and the entire delivery process is accomplished more quickly.

(2) Women with a gestational age of 37 to 42 weeks, a singleton pregnancy, vertex presentation, and no evidence of fetal distress prior to the onset of labour (e.g., non-reactive non-stress test) were included.

(3) Women who presented with spontaneous onset of labour as determined by regular contractions, cervical effacement, and dilatation of 1 to 2 centimeters were included.

(4) Women transferred from other facilities with complications of labour were excluded from the study.

Data Collection

Data were manually extracted from the medical records of the selected sample and recorded on the attached data collection sheet (Appendix A). A colleague coded a random sample of 20 charts to determine accuracy in recording. Random numbers were used to select these charts. All charts of primiparous women who met the inclusion criteria were reviewed and charts were selected into groups on the basis or the presence of the independent variable (i.e., non-narcotic, narcotic, epidural before 5 cm, or epidural after 5 cm dilatation). Since there were more charts in the non-narcotic and narcotic groups, the daily labour and delivery log books were reviewed. Charts were matched with the epidural groups, according to cervical dilatation on admission and birthing day. When charts could not be matched with the same birthing day, they were matched with subjects on the preceding or next day. This was done prior to reviewing the charts for data collection.

Data Analysis

Data collected were entered into the computer and analyzed using the SPSS (version 7.0) statistical program (Norusis, 1993). Every fifth entry was checked by a research assistant to ensure accuracy of input. The conventionally accepted level for a Type 1 (alpha = 0.05) error was used.

Question 1

To determine the difference in method of pain management between the non-epidural groups (Group 1 & Group 2) and the epidural groups (Group 3 & Group 4) on the rate of normal vaginal delivery, instrumental delivery, and cesarean section, Chi-square analysis was used.

Question 2

To measure the difference in the incidence of normal vaginal delivery, instrumental delivery and cesarean section, in women who receive epidural anesthesia before 5 centimeters (Group 3) as compared to those whose epidural is placed after 5 centimeters (Group 4), Chi-square analysis was used.

Question 3

Chi-square analysis was used to determine the difference between non-epidural groups (Group 1 & Group 2) and epidural groups (Group 3 & Group 4) on the use of Syntocinon augmentation during the first stage of labour.

Question 4

To measure the difference in the length of the second stage of labour in primiparous women who received epidural anesthesia (Group 3 & Group 4) as

compared to those who received non-epidural methods of pain management (Group 1 and Group 2), analysis of variance (ANOVA) was used. Multiple comparisons using the Student-Newman-Keuls statistical test was then conducted to determine which groups differed.

Question 5

To examine the difference in Apgar Scores at 1 minute and 5 minutes in newborns of primiparous mothers who used non-epidural methods of pain management compared to those who received epidural anesthesia, Apgar Scores for the four groups were analyzed using analysis of variance. Post-hoc analysis (Student-Newman-Keuls test) was then used to determine which groups differed.

Question 6

To address the final question, "Is there an increase in maternal temperature with the use of epidural anesthesia?", analysis of variance was used to analyze the data.

Population characteristics were analyzed using descriptive statistics. Data on extraneous variables (maternal age, height and weight, and newborn weight) were collected during the data collection stage and were also analyzed using descriptive statistics (mean, range, standard deviation, and percentages). Logistic regression analysis was conducted to determine the effect of extraneous variables on group differences.

Ethical Considerations

A letter of approval for the research project was obtained from the Regional Medical Advisory Committee and the Regional Quality Management Committee, David Thompson Health Region (Appendix B). The proposal was submitted to the Ethics Review Committee of the Faculty of Nursing, University of Alberta, and approval was obtained prior to the commencement of data collection. All data collected was extracted from medical records by the researcher. Confidentiality was maintained since names were not recorded on the data collection sheets. Raw data is being stored separately, in a locked cupboard, from the final report. The raw data will be kept for a period of 7 years. There is no mention of names or identifying characteristics in the data analysis or discussion of results.

CHAPTER 4

RESULTS

The results of the data analysis are presented in this chapter. First, the characteristics of the sample are outlined to assess similarity of the groups. Second, each of the six research questions are presented with their respective results.

Characteristics of the Sample

The total number of patient charts included in the study was 232. The non-narcotic group (Group 1) and the narcotic group (Group 2) had 84 charts in each group. The epidural groups (Group 3 - epidural before 5 cm, and Group 4 - epidural after 5 cm dilatation) had 31 and 34 charts, respectively, making a total of 65 epidural charts. All subjects were term primiparous women with vertex presentation of a singleton pregnancy who presented with spontaneous onset of labour. The mean age for the women was 24.7 years (range = 14-39 years). The mean weight was 78.059 kilograms (range = 54.1-119.5 kilograms), and the mean height was 162.9 centimeters (range = 148-180 cms). On admission, the mean cervical dilatation was 3.49 centimeters (range = 1-10 cms). The average gestational age in weeks was 39.57 weeks (range = 37-42 completed weeks). The mean newborn weight was 3414 grams (range = 2480-5115 grams). A summary of the sample characteristics is presented in Table 4-1.

Table 4-1

Sample Characteristics

	N	Range Minimun	Maximum	Mean	Standard Deviation
maternal age in years	233	14	39	24.7	5.21
maternal weight in kgs	227	54.1	119.5	78.059	12.01
maternal height in cms	219	148	180	162.90	6.79
completed weeks of gestation	233	37	42	39.57	1.12
admission dilatation in cms	230	1	10	3.49	1.78
newborn weight in grams	233	2480	5115	3414	420.38

When presenting in labour only 3.4 percent of women had a doula or midwife with them, while 85.4 percent had husbands, boyfriends, mothers, sisters, aunts, or friends for support during labour. The remaining charts (11.2%) did not indicate whether a support person accompanied the patient.

Type of Delivery

The four groups were compared on type of pain management (non-narcotic, narcotic, epidural before 5 cm, and epidural after 5 cm) and birth outcome (spontaneous delivery, instrumental, or cesarean section). Analysis of the data using Chi-square resulted in a significant difference between the groups ($\chi^2 = 56.373$, df = 6, $p < 0.0005$). Crosstabulation of the results indicated there was a higher number of spontaneous deliveries than would be expected for the non-narcotic and narcotic groups (Group 1 & 2, expected = 60.2; Group 1, actual = 74; and Group 2, actual = 67). The actual number of instrumental deliveries

and cesarean sections was also less than expected (Table 4-2). The results for Group 3 (epidural before 5 cm) and Group 4 (epidural after 5 cm) were directly opposite to Groups 1 and 2. The number of expected spontaneous deliveries in both Groups 3 and 4 was lower than expected, and the actual rate of instrumental and cesarean section was higher than expected (Table 4-2).

Table 4-2

Group Comparisons on Type of Delivery

		Type of Delivery			
		spontaneous	instrument	c-section	Total
Group I non-narcotic	Count	74	6	4	84
	Expected Count	60.2	10.5	13.3	84.0
Group 2 narcotic	Count	67	6	11	84
	Expected Count	60.2	10.5	13.3	84.0
Group 3 Epidural before 5 cm	Count	12	5	14	31
	Expected Count	22.2	3.9	4.9	31.0
Group 4 Epidural after 5 cm	Count	14	12	8	34
	Expected Count	24.4	4.2	5.4	34.0
Total	Count	167	29	37	233
	Expected Count	167.0	29.0	37.0	233.0

Groups 1 and 2 were then combined, as were Groups 3 and 4. Chi-square analysis yielded similar results as when the groups were analyzed separately. There was a significant difference between the non-epidural groups as compared to the epidural groups on type of delivery ($\chi 2 = 44.552$, df = 2, $p < 0.0005$). There were more spontaneous deliveries and less instrumental and cesarean section deliveries in Groups 1 and 2 than expected. On the other

hand, Groups 3 and 4 had less spontaneous deliveries than expected and more than the expected number of instrumental and cesarean section deliveries. This analysis shows that an epidural is related to increased numbers of cesarean section and instrumental deliveries.

Extraneous or confounding variables identified during data collection that could affect the outcomes were maternal age, maternal height, maternal weight, and newborn weight. These variables were entered into a logistic regression equation and results indicated that none of these variables contributed significantly to the relationship between pain relief method and type of delivery (Table 4-3).

Table 4-3

Epidural versus no epidural

Variables	Regression Coefficient	t	Overall R	Overall F	Probability
Spontaneous Vaginal Delivery	-.407	-5.062			<.0005
Instrumental & C-Section Delivery	-.004	-.048			.962
Maternal Age	.057	.902			.368
Maternal Weight	.096	I.510			.132
Maternal Height	.099	1.576			.117
Newborn Weight	.088	1.387			.167
			.465	9.617	<.0005

Timing of Epidural Placement

Using the Chi-square statistic, data from Groups 3 and 4 were analyzed to determine whether epidural had an effect on the type of delivery when placed

before 5 centimeters dilatation as compared to placement after 5 centimeters dilatation. No significant differences were found between the two groups ($\chi 2=4.544$, df= 2, $p = 0.103$). Both groups had similar numbers of spontaneous deliveries regardless of time of epidural placement (Group 3 = 12 & Group 4 = 14 spontaneous deliveries). Although significant differences were not found between the two groups, it is interesting to note that there were 14 cesarean sections and 5 instrumental deliveries in Group 3 (epidural before 5 cm); whereas in Group 4 (epidural after 5 cm) there were 8 cesarean sections and 12 instrumental deliveries, almost a reversal of the numbers between the 2 groups (Table 4-2).

Syntocinon Augmentation

Analysis of the data using Chi-square yielded a value of $\chi 2 = 195.096$, df = 9, $p < 0.0005$. The use of syntocinon was significantly related to epidural usage.

Table 4-4

Group Comparisons on Syntocinon augmentation

		Syntocinon augmentation			Total
		no syntocinon	syntocinon before epidural	Syntocinon after epidural	
Group 3 epidural before 5 cm	Count	4	9	18	31
	Expected Count	19.6	2.1	5.2	31.0
Group 4 epidural 5 cm and above	Count	6	7	21	34
	Expected Count	21.5	2.3	5.7	34.0
Total	Count	10	16	39	65
	Expected Count	10.0	16.0	39.0	65.0

Only 10 of 65 subjects who had epidural had no syntocinon. Of the remaining 55 women, 16 had syntocinon augmentation established shortly before epidural and 39 had syntocinon after epidural had been placed. These numbers were larger than the expected count when crosstabulation was done. Table 4-4 shows the expected and actual count for Groups 3 and 4.

Length of the Second Stage

The effect of group differences on the length of the second stage of labour were calculated using analysis of variance (ANOVA). Significant differences in the length of the second stage of labour ($F = 12.081$, $df = 3$, $p < 0.0005$) were found. To determine which groups differed, the Student-Newman-Keuls test was used and there was no difference between the non-narcotic and narcotic Groups 1 and 2 (58.86 min versus 54.35 min). The average length of the second stage for Group 3 (epidural before 5 cm) was 85.16 minutes and Group 4 (epidural after 5 cm) was 119.32 minutes. These results indicate that there is a significant difference with the use of epidural in the length of the second stage as compared to the narcotic and non-narcotic groups. There is also a significant difference in the length of the second stage when epidural is placed before 5 centimeter (Group 3) as compared to after 5 centimeter dilatation (Group 4)(85.16 versus 119.32 min).

Apgar Scores

The analysis of the data by analysis of variance revealed a significant difference in apgar scores ($F = 8.067$, $df = 3$, $p < 0.0005$) related to group

membership. Post-hoc analysis using the Student-Newman-Keuls test indicated that apgar scores were lower in the epidural before 5 centimeter group than in the other 3 groups. Overall, the data indicated that apgar scores were satisfactory for all groups. Only 5 newborns (2.1%) in the entire sample (n=233) had apgars under 7 at 1 and 5 minutes. Apgar scores under 7 at l minute and over 7 at 5 minutes were reported in 51 newborns (21.9%). The remaining 76 percent (177 newborns) had apgar scores of 7 and over at both 1 and 5 minutes.

Maternal Temperature

Between group differences in maternal temperature were evaluated using analysis of variance. Significant differences in maternal temperature between the 4 groups ($F = 2.456$, $df = 3$, $p = 0.064$) were not found. The results indicate that maternal temperature was no different with epidural usage when compared before and after delivery with the other groups.

CHAPTER 5

DISCUSSION OF RESULTS

This study was designed to investigate the relationship between method of pain management during labour and birth outcomes. A retrospective chart review of primiparous deliveries from January 1, 1995 until July 20, 1997 was conducted. Charts of 232 women who met the inclusion criteria were selected and assigned to 4 different groups based on the presence of the independent variable (i.e., non-narcotic, narcotic, epidural before 5 cm, or epidural after 5 cm dilatation). Data were analyzed, and reported for each of the six research questions: 1) the effect of method of pain relief on type of delivery, 2) the effect of time of placement of epidural anesthesia on the type of delivery, 3) the relationship between use of syntocinon augmentation and method of pain management, 4) the effect of pain management method on the second stage of labour, 5) the effect on apgar scores with method of pain management and, 6) the effect pain management method has on maternal temperature.

Type of Delivery

Using Chi-square analysis significant differences were found between methods of pain relief and type of delivery. Crosstabulations of the data yielded significantly greater than expected number of cesarean sections and instrumental deliveries with epidural methods of pain relief as compared to non-epidural methods. Findings support previous retrospective studies reporting that epidural is related to increased frequency of cesarean section and instrumental

deliveries (Lieberman, et al., 1995; Farabow, et al., 1993; Thorp et al., 1991; 1993). Therefore, this finding was not unexpected.

It is interesting to note that the actual number of spontaneous deliveries was higher in the non-epidural groups than expected and that the instrumental and cesarean section rates were lower than expected. This may be due to the obstetrical management of patients in labour by both physicians and nurses at this hospital. When reviewing charts it was found that along with excellent support from nursing staff, hydrotherapy was used extensively. Almost all patients were either to the tub or shower, often for lengthy periods of time, on one or more occasions during labour. The literature suggests that hydrotherapy is a potent form of relaxation, comfort and pain relief. Relaxing in a tub has been reported to lead to more rapid cervical dilatation than expected (Church, 1989; Milner, 1988; Odent, 1983; Waldenstrom & Nilsson, 1992). It has also been reported that hydrotherapy allows for easier rotation of transverse and posterior presentations which may account for less instrumental and cesarean section deliveries (Aderhold & Perry, 1991; Church, 1989; Milner, 1988; Odent, 1983).

Although an association between epidural and cesarean section has been documented in other studies, in this study some of the difference between the non-epidural and epidural groups may be attributed to the facilities low rate of epidural. Epidural appears to be used in circumstances where the patient is having a protracted or difficult first stage of labour and is not coping well with other pain relief measures. It could be that some of these patients are already candidates for a cesarean section and epidural is placed in an attempt to allow

the patient to have every opportunity to deliver vaginally.

Timing of Epidural Placement

No significant differences were found between the two groups related to when the epidural was placed. This finding was unexpected. On the basis of previous research (Lieberman et al., 1995; Morton, et al., 1994; Thorp et al., 1993) it has been reported that there is an increase in the number of cesarean sections when epidurals are placed before 5 centimeters dilatation for failure to progress and dystocia. It is theorized that epidural causes laxity of the pelvic floor musculature and if epidural is placed before 5 centimeters there is a greater risk of malposition. When administered at 5 centimeters or more, optimal positioning of the fetal head has most likely occurred. The lack of difference in this study could be related to the small sample size in the epidural groups (Group 3, n=31; Group 4, n=34).

Of interest is the finding that the epidural before 5 centimeters resulted in 14 cesareans and 5 instrumental deliveries; whereas the epidural after 5 centimeters resulted in 8 cesarean sections and 12 instrumental deliveries, a reversal of the numbers between the two groups. This could be due to the fact that better positioning had occurred when the epidural was placed later, resulting in fewer cesarean sections. The earlier group may have had more cesarean sections due to failure to progress after the epidural was placed.

Syntocinon Augmentation

Analysis of the data yielded a difference between the two pain relief methods and syntocinon augmentation. Whether or not syntocinon was used,

was a predictor of being in the epidural group. Only 10 women out of 65 who had an epidural had no syntocinon, and of the remaining 55 women, 16 had syntocinon augmentation shortly before, and 39 had syntocinon after the epidural had been established. Previous research supports this relationship between epidural and syntocinon usage. Iglesias and colleagues (1992) report that syntocinon usage increased dramatically (14% to 52%) with epidural use. Farabow and associates (1993) report that epidural anesthesia was associated with increased oxytocin usage to initiate or stimulate adequate labour.

Length of the Second Stage

Analysis of the data resulted in significant differences in the length of the second stage of labour. Post-hoc analysis to determine which groups differed, revealed that there was no difference between the two non-epidural groups in the length of the second stage. A difference did exist between the non-epidural groups and the epidural groups, and also between the two epidural groups. The average length of the second stage in the narcotic group was 54.35 minutes, and the non-narcotic group was 58.86 minutes. These differences were not significant. The epidural before 5 centimeter group was 85.16 minutes and after 5 centimeter group was 119.32 minutes. The literature supports an increase in the number of minutes of the second stage with the use of epidural (Iglesias et al., 1993; Thorp et al., 1991; 1993). The difference in the length of the second stage between the two epidural groups was not an expected finding and has not been reported in the literature. This finding might be attributed to several factors. The before 5 centimetre group may have had an shorter average length of

second stage because this group had 14 cesarean sections, and 5 instrumental deliveries. Looking back at the data, the majority of these women had cesarean sections prior to reaching the second stage of labour, therefore, the length of the second stage was not reported. The epidural after 5 centimeters on the other hand, had 12 instrumental deliveries, and only 8 cesareans. The length of the second stage may have been longer for those who eventually delivered with the use of instruments.

Apgar Scores

Analysis of the data resulted in a significant differences related to group membership. Post-hoc analysis revealed that the apgar scores for the epidural before 5 centimeter group differed from the other groups. This was an unexpected finding as previous investigations suggest that no differences have been found in apgar scores when comparing non-narcotic, narcotic, and epidural methods of pain management (Alahuhta et al., 1993; Chestnut et al., 1994a, 1994b; Loftus, et al., 1995). Although the scores were slightly lower, all apgar scores were satisfactory with only 2.1 percent (5 newborns) having apgar scores under 7 at 1 and 5 minutes. Apgar scores under 7 at 1 minute and over 7 at 5 minutes were reported in 21.9 percent (55 newborns). The remaining 76 percent (177 newborns) had apgar scores of 7 and over at both 1 and 5 minutes.

Looking back through the data to determine if a pattern for lower apgar scores would emerge in the before 5 centimeters group (Group 3), it was found that only one newborn who was delivered by cesarean section for fetal distress (cord compression) had an apgar score under 7 at one and five minutes.

Seventeen newborns had apgar scores under 7 at 1 minute and over 7 at 5 minutes. The remaining 13 newborns had apgar scores at 7 and over both at 1 and 5 minutes. The length of the second stage of labour for 3 newborns with low 1 minute apgar scores were longer (122, 133, and 270 minutes) than the average length of the second stage (Group 3=85.16 minutes). Although 17 newborns had lower apgar scores at 1 minute, they had satisfactory scores at 5 minutes (7 and over). Therefore, although a statistically significant difference between the epidural before 5 centimeter group and the other 3 groups was reported, and several infants showed signs of distress at delivery (1 minute), by 5 minutes the condition of the newborns were satisfactory in all but one infant. A pattern explaining why apgar scores were lower in the epidural before 5 centimeter group could not be determined. However, these women may have experienced a long and exhausting prodromal labour resulting in slightly lower apgar scores overall.

Maternal Temperature

Analysis of variance resulted in no significant differences in maternal temperature when compared before and after delivery across all groups. There are several studies that have reported an association between epidural analgesia and maternal pyrexia during and following labour (Camann, et al., 1991, Fusi et al., 1989;, Macaulay et al., 1992; Pello et al., 1991). Fusi and colleagues (1989) theorize that epidural block creates an imbalance between the heat producing and heat dissipating mechanisms in the body, which can lead to the development of pyrexia during and after labour. However, this study did not

support these findings. Perhaps the coding of temperatures at 37.5 degrees may not have been subtle enough to detect slight elevations in maternal temperature.

Implications for Nursing

There appears to be an association between the method of pain management in labour and birth outcomes. Specifically, epidural anesthesia appears to be related to an increased incidence of instrumental and cesarean section delivery. The appropriate education of nurses, midwives, prenatal instructors, and other health care workers providing antenatal education to pregnant women is of paramount importance. Therefore, it is imperative that nurses be well informed regarding the benefits, risks, and complications of pain management strategies and how they affect birthing outcomes.

Over the past few years, nursing has taken a health promotion focus. Health promotion focuses on cooperation, collaboration, and coordination. The relationship between nurses and patients have changed. Nurses require increased knowledge and play a significant role in providing information to enable clients and their families to become equal partners and active participants in health care decisions. Nurses, most often are the major support person during labour, and their recommendations and suggestions can influence decisions made by pregnant women and their families. Nurses are in an ideal position to ensure that clients have sufficient information to make informed decisions as to which type of pain management strategy is right for them.

Prospective parents should be informed that when choosing epidural anesthesia, they could expect an increase in the length of time spent in the second stage of labour and that there is an increased risk of requiring syntocinon augmentation. They should also be informed that the use of epidural anesthetic may increase their likelihood of instrumental and cesarean section delivery.

Limitations of the Study

A retrospective chart review may result in collecting inaccurately charted information from the medical record. Some charts had more thorough charting than others. Data on sample characteristics such as height and weight were occasionally missing from the charts. Misinterpretation of meaning in the written documentation is also a possible source of error. Extraneous variables such as environmental conditions, nursing staff, physicians, time of day, month, and year cannot be controlled, may not even be identified, and may affect the results. In an attempt to address this potential source of error, subjects were matched according to birthing date prior to data collection.

Red Deer Regional Hospital Centre has a low epidural rate (1994, 2.4%) and appears to use it discriminately when other methods of pain management are inadequate. Also, there is not always a physician readily available to perform the epidural procedure. Therefore, this study may not be generalizable to larger city hospitals that have a 24-hour epidural service where it is freely available upon patient or physician request.

Recommendations for Further Research

Most of the research to date has been retrospective chart reviews to determine the effect of epidural on birth outcomes. Research based on a large prospective sample is necessary to confirm the results of this study and previous research. Much of the present research is conflicting and a larger prospective study may help to clarify the association between epidural and birth outcomes.

Nurses are providing much of the information on pain management strategies in prenatal classes and require more knowledge in this area from a nursing perspective. Future research could include areas of investigation such as maternal satisfaction with various methods of pain management, satisfaction with birth outcomes and early newborn behaviors (i.e., alertness, 'latching on'), whether informed decisions on pain management strategies are possible with the information presented in prenatal classes, apgar scores with epidural anesthesia, and maternal/newborn temperature with the use of epidural.

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APPENDIX A

#	dob	ex	doula	mat age		ht	wt	rest	new wt		group	delivery		loss	symto	appn scores			temperature		
				age	code				wt	code		del	code			1 min	5 min	code	bef	aft	code

D H R

David Thompson Health Region

APPENDIX B

1997 03 27

Mrs. N. Walker, R.N., B.N.,
Site 2, Box 18, R.R. 3,
Ponoka, Alberta. T4N 1R3

Dear Mrs. Walker:

RE: Study in RDRHC Medical Records Department for M.N. Thesis: "The Relationship Between Method of Pain Management During Labour and Birth Outcomes"

I am pleased to inform you that the Regional Medical Advisory Committee, 1997 03 27, approved the Regional Quality Management Committee (QMC) recommendation that the above study be approved subject to the following:

1. Approval by the Joint Ethics Committee of the Capital Health Authority and University of Alberta.

2. Maintenance of Confidentiality as delineated on page 36 of the Thesis Proposal, September 1996. This includes NON identification of patients and physicians, as well as signing the RDRHC Medical Records Department "Confidentiality Agreement".

3. Providing the Medical Director with a copy of the thesis.

Could you please contact Mrs. Simone Bailly. Manager, Health Records Department, and sign the "Confidentiality Agreement".

I have been directed by the QMC to inform you that Red Deer's epidural rate is low compared to other facilities. Many patients arriving at Red Deer are already on their way to having a caesarean section performed and will have been given drugs prior to arrival. The concern is that this may result in a selection bias.

Yours sincerely,

J.A. Ordman, M.B., B.Ch.(Rand), F.R.C.S.C.,
Medical Director, David Thompson Health Region.

/tdp

cc: Dr. B. Inglis. Vice President - Medical Staff
Dr. S. Boutros. Chief of Obstetrics & Gynecology
Mr. A. Martin. President/CEO
Mr. G. Birbeck. Vice President - Central
Mr. L. Davidson. Vice President - North
Mrs. S. Bailly. Manager - Research and Analysis, Patient Information Centre
Ms. S. McNalley, Patient Information Centre
Medical Advisory Committee

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